

Applying New Police Technologies to Disaster Victim Identification

Abstract

With modern biometric files (including DNA and fingerprints) and their computerized retrieval, the police/medical examiner interface in terms of DVI has to be readjusted. Medical examiner offices are built for routine work. A key goal in the aftermath of mass casualty disasters is the reduction of cases handled by medical examiners (whose facilities and manpower are often overwhelmed by large numbers of cases). Biometric files are one method to reduce cases.

Keywords: Disaster victim identification; Fingerprints; Deoxyribonucleic acid; Biometric identification

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Introduction

Recent advances in police technology, particularly in crime laboratories, have necessitated a general re-examination of the police and medical examiner roles in disaster victim identification (DVI) in the forensic arena [1]. Despite these technological advances, the issue has rarely been pin-pointed in professional literature. The results of a re-examination are profound and require a revised infrastructure in the DVI process. In traditional terms forensic science was applied to the technical examination of potential evidence such as fibers, handwriting, drug analysis, and ballistics, all of which were oriented toward the crime scene and the identity of the perpetrator.

Today, forensic science in DVI plays a double role. In a mass casualty incident forensic activity not only focuses upon identification of the perpetrator, when there is someone to be held responsible for the occurrence of a disaster (such as a terrorist bombing or a fire caused by arson). DVI is focused on the identification of the victims. That effort often dominates initial media coverage, particularly when no apparent crime is involved. The medical examiner is often the center of popular interest, but today police also play a critical role.

Forensic Medicine

Crime investigation is traditionally a responsibility in police hands. Given the historically restricted focus of DVI, that activity has typically been considered the domain of the medical examiner, whose role is limited to forensic medicine --- cause of death and identity of the victim. The medical examiner leading investigations is a Hollywood film phenomenon. There is an interesting quirk that has all too often been overlooked. Disasters are mass events, overwhelming the response infrastructure. According to some, that is the very definition of a mass disaster --- an event overriding the routine infrastructure. In some historical disasters sometimes identification has been cursory to streamline procedures, basing efforts on property and/or personal recognition that satisfies local officials and bypasses the

entire scientific network. This effort is done in compliance with the law of the jurisdiction in which the disaster occurs, but in today's global society it might not necessarily meet the requirements of all jurisdictions whose citizens are involved. Many countries have set standards for identification for issues to be resolved such as insurance, inheritance, a spouse's marital status, etc.

DVI Methods

The classic role of DVI --- the identification of victims --- is the positive comparison of ante mortem and post mortem data of sufficient significance. The key phrase is "sufficient significance," a judgment usually made by an expert. An important qualification should be understood --- identification "by a recognized method or methods." There are some DVI methods whose significance is not challenged. Fingerprints, for example, are universally accepted as unique to a specific individual. A positive AM/PM comparison is unquestionably a sound identification. If there is room for critique in methodology, it is only if there are errors in evidence handling, comparison, or insufficient points of agreement. In traditional terms, as will be discussed, this has been a field of police expertise, properly overseen by a quality control officer (often a second expert).

Forensic odontology is another classic DVI method [2], this best handled by specialists in forensic medicine [3,4]. Dental treatment can be unique, and if there are sufficient individualities in teeth structure and treatment, this can be the basis of identification. Here it should be stressed that routine dentists are often not best to use for identification, since their expertise is not in the evaluation of dental work done in the time span between AM and PM records, nor are they necessarily in a position to express an opinion about individuality. This is best performed by a forensic odontologist, working independent of the conclusions of other experts but often under the legal authority of a medical examiner.

There are numerous other methods common in the field, such as scars and x-rays showing medical history. Even tattoos can play a role, albeit not necessarily decisive. Their evidential

value for identification, however, is best evaluated by a medical examiner. Property, usually a police concern, poses interesting questions. Associating belongings to a particular victim can be an error-prone exercise. Even items that are worn or in pockets can be gifts, loans, or inheritance. Police experience shows that property is at best a basis for further investigation and not a basis for identification. "Investigation" is key. Property belongs to police investigative units and not to the forensic laboratory (unless there are questions such as blood stains).

This background shows that in traditional terms there certainly is a partnership between the police and the medical examiner in DVI, but the police forensic role was traditionally minimal --- fingerprints. Times, however, have moved on. Except for fingerprints the medical examiner decides if particular data are sufficient for identification. How unique is a certain scar? If it is from a specific operation, maybe not unique. If it is from a road accident, maybe yes unique. Is an autopsy necessary?

AM/PM

In typical non-disaster cases the offices of the medical examiner routinely seek a limited set of ante mortem medical records as the basis of an AM/PM comparison. With one or two bodies the medical examiner can determine exactly what he needs --- fingerprints, dental records, etc. Mass casualty disasters are different. A broader spectrum of ante mortem records is needed for the identification jigsaw puzzle. Only in truly mass disasters does the office of the medical examiner, usually relatively limited in manpower, interact on a broad scale with police investigative units (not with the forensic laboratory), relying upon police investigators to obtain ante mortem records from hospitals, doctors, and dentists. Since the requisitioned ante mortem records are basically medical in nature, the medical examiner has the necessary expertise to specify what is needed. This activity dove-tails with police criminal investigations, but it is kept quite separate. In any case the police forensic laboratory is not involved.

Fingerprints

Fingerprint retrieval was historically a police function involving a technician with a brush in hand, dusting a crime scene surface. In terms of DVI, the role of the police was essentially limited to ante mortem collection, often at a home or place of work. It was the test of an expert to decide which powder was appropriate for particular surfaces. In later years more advanced fingerprint retrieval methods became prevalent, primarily in serious crimes. The technician served to reinforce police dominance in fingerprint technology in the public eye. From a bureaucratic perspective modern fingerprint development techniques have placed fingerprints soundly in the realm of forensic science, even though the "powder and brush technician" still catches the public eye.

Post mortem fingerprints can sometimes be simple to take from a deceased person, but especially after decomposition [5] or burn damage, more extensive expertise is needed. Often the role of fingerprints --- from retrieval to comparison --- is almost always assigned by the medical examiner to police specialists. After fingerprint retrieval the next step in the DVI process is AM/PM fingerprint comparison at the request of the medical

examiner. Police experts might compare AM and PM prints, however formal "identification" of the deceased curiously remains the responsibility of the medical examiner in the vast majority of jurisdictions. On the one hand the medical examiner delegates the fingerprint task, yet he retains overall responsibility (similar to the role with odontology). It is almost as though he is assuming the role of a quality assurance officer for fields not in the realm of his professional expertise. Does one have to physically see a victim to identify him? The medical examiner might say "yes," but the police routinely make fingerprint identification without "seeing" the persons involved.

Introduction of DNA and Computerized Files

Administrative aspects of DVI are changing. From an historical perspective the 1990s progressively marked the beginnings of fundamental and practical changes in the approach to DVI. Newly discovered DNA became a primary identification method. The age of computerization was ushered in. In parallel this also allowed for the building of biometric databases as a common forensic tool. Additionally, further changes in DVI took hold incrementally, incorporating evolving technological advancements. These changes involved other computerized files. A general function in police operations is crime prevention --- in other words taking a proactive approach before a crime is committed. In DVI terms, this means the maintenance of identification records in case they are needed. This is standard procedure, for example, in modern armies, which keep well-documented identification files on soldiers.

A common civilian application is police biometric files that can be extensive and include a wide range of information [6]. In terms of data retention, the longer information is kept, the more vulnerable it is to unauthorized access. There are, of course, questions of civil liberties if biometric data are to be retained after their designated use has apparently expired and information security. An example would be the retention of a DNA sample after the resolution of a paternity dispute. There is, of course, a potential use for DVI if such becomes necessary. For numerous purposes there are advantages in retaining biometric files. An example from the United Kingdom illustrates the issue.

In the case of *S. and Marper v. the United Kingdom* [7] argument was made to the European Court of Human Rights that British authorities retained fingerprint and DNA records after the two persons had been acquitted of the crimes of which they were accused. The police rebuffed the request of the two individuals that their records be destroyed. The background to the police position is illustrative of the matter in question. Testimony was presented that 6000 DNA samples which might have been destroyed under non-conviction guidelines were linked to 53 murders, 33 attempted murders, 38 sex offences, 63 aggravated burglaries, and 56 drug cases.

In other words the United Kingdom experience clearly shows that there can be significant benefit derived from retaining ostensibly "useless" data. The primary financial cost of biometric files is involved in collection, not retention and retrieval. The basic issue of content on is not monetary cost versus police utility. The issue essentially involves privacy concerns and potential police operations. Similar to the UK case, numerous "cold cases" have

been solved using data on file in other countries [8]. Unfortunately there are no published statistics regarding DVI, but it is clear that large data bases have an enhanced possibility to identify victims of a disaster. These databases are, of course, in the police domain and not that of the medical examiner [9].

The Big Board

Historically, due to the practical restrictions imposed by manual record searches, the identification of victims was divided into two groups: an “open population” and a “closed population.” This was considered a pragmatic and efficient approach. Victims in an air crash, for example, would essentially be a “closed population” based on, let us say, a passenger list or boarding cards (allowing for certain discrepancies such as travel on forged and stolen passports, clerical errors, missed flight connections, etc.). By way of contrast, fatalities resulting from an earthquake in a downtown area such as Christchurch, New Zealand (2011), the terrorist attack in the Bataclan Theater(2015) or other types of disasters in public areas would constitute an “open population,” since virtually anyone could be a victim. This dichotomy simplified data searches and comparisons.

The typical bureaucratic approach was the “big board,” showing victim numbers, available post mortem data, and hopefully an eventual identification (often with a note regarding the technical basis). Since the “big board” was manual, it was centralized and updated, primarily in the offices of the medical examiner. This is not to say that the road to computerization was simple. In one major air crash at the beginning of the computerization era identifications began only after the computer was replaced by the “big board.” Times, however, have changed. Software has improved significantly as has general familiarity with computers. The “big board” still exists, however it is now a computer program available at numerous authorized stations with the ability for searches by various parameters. It is no longer in the sole domain of the medical examiner.

Biometric Files

The advent of computerization and its subsequent product, expanded biometric files, have mandated a change in procedures. A wide range of personally and biometric data [10] is now in police hands. For considerations of privacy [11] and according to established work practices, the police, not the medical examiner, are in possession of extensive ante mortem information previously not readily available or available at all. To cite one example, police today generally have extensive DNA files from past crimes as well as from civil matters such as paternity claims and certain employment. In a DVI case, when a medical examiner needs a DNA search of police files, most often he must provide a post mortem sample and request a database search from the police (sometimes subject to court authorization). Taking this one step further, particularly in a disaster the police can take DNA samples in the field, avoiding transportation of the deceased and overloading the medical examiner’s office. Various controls are in effect according to local law, but separation of authority is virtually universal in developed countries; medical examiners cannot search police files.

When the police determine that there is a match to a DNA [12] sample in their files, they are essentially identifying the victim. At that point, the medical examiner’s role is again transformed from identification to making a formal confirmation of the identity of the victim. This is a very substantive reversal of roles. This is similar to fingerprint identification, for example, where the medical examiner is confirming, not identifying.

The various versions of computerized fingerprint retrieval (AFIS) have also made a serious impact on ante mortem retrieval with almost exclusive responsibility in police hands as opposed to the medical examiner.

There is another important change in concept. Now that the computer has replaced the “big board,” the medical examiner is no longer in sole control of data tracking. Computer stations give the possibility of multiple accesses. Control of data by the medical examiner has been replaced by oversight and coordination.

Identification

Attempting to apply objective criteria in the analysis of the transfer of authority in, for example DNA or fingerprints, from the medical examiner’s office to the police has spawned controversy. Given that the police can convict a criminal based upon DNA, which can result in a person spending the rest of his life in jail, it seems reasonable that a DNA comparison can be deemed sufficient to identify a deceased person. The same can be said for fingerprint comparison. In terms of DVI, one might well ask if legislation should not replace the medical examiner’s “identification” with his “coordination.” In a mass disaster there can be extensive pressure on a medical examiner’s office. It should be noted that every external, positive identification in times of disaster means that yet another body does not have to be seen by the medical examiner, whose facilities (if not manpower) are overwhelmed. With police identification by DNA and fingerprints, this does not mean a lowering of standards. It means enacting legislation that recognizes a changed technological venue.

Another point of frequent contention in the police / medical examiner interface in DVI is the use of the paperwork to be used. The medical examiner focuses on each victim and extracts post mortem information. A mass disaster is often seen as a magnification of single cases, so the same paperwork is used. In police terms ante mortem data is often collected internationally, often by digital transmission. This has encouraged the use of modernized Interpol forms to promote standardization and facilitate data comparison with quality assurance oversight [13].

Information transmission is not a simple legal question, and it must be resolved on a local level. To whom does a foreign country submit data? To its police counterpart? To the relevant Interpol NCB? Even within country the question is not simple. DVI often involves military [14], fire, or police personnel, either in their line of duty or in the course of their off-hours civilian functions. Particularly in the case of soldiers this adds another dimension to ante mortem data for DVI. Yet there are legal and procedural issues still to be resolved in the handling of ante mortem data. Notably, do files go to the police or to the medical examiner? Or, should the decision made based upon available post mortem information?

As insurance against error, it is currently standard DVI procedure in many jurisdictions that a deceased person be identified by two methods. Where a second method is performed by the medical examiner, it seems reasonable to call it verification and not identification. (There is recommended Interpol procedures for multiple methods, but it should be remembered that these are recommendations that do not replace or override local law. They are recommendations and not dictate.) There have been suggestions to appoint an "identification board" to oversee DVI in a mass disaster. Both the medical examiner and the police would be represented. Although this might seem initially reasonable, it is contrary to a basic principle of disaster management --- assign emergency tasks as close as possible to routine tasks. Instead of inventing new positions for emergencies, it is better to re-define tasks for routine work in preparation for emergency.

Looking to the Future

This paper certainly does not suggest stripping the medical examiner of his authority. Beyond identification of the victim, there remains another issue that rests exclusively in the domain of the medical examiner. When criminal aspects exist (for example, an aircraft bombing, stabbing, or missile), specific cause of death must also be determined for investigative purposes and possible subsequent prosecution. A case is not closed once the police or medical examiner issues identification, even when it is verified by the medical examiner or coordinated with him.

Identification authority has to be adjusted. Clearly there must be a chain of command vis à vis evidence in DVI as it pertains to criminal prosecutions. It is most reasonable to propose that such a chain of command be a commonly agreed upon effort recognizing new realities in the handling of data. The ultimate goal, however, must be to reduce the case load of the medical examiner (in a reasonable and not reckless manner) in a mass disaster (particularly in the absence of a civilian infrastructure as in an earthquake), so that he can concentrate efforts on cases truly needing his professional attention. It is insufficient to merely acknowledge changes pro forma in DVI procedures due to modern technology. It is more constructive to re-work the administrative framework, so that the benefits of those changes can be maximized. In pragmatic terms this means bureaucratic recognition of capabilities and responsibilities so that unnecessary duplication of paperwork and rubber-stamping can be avoided. On the other hand any re-organization must also safeguard coordination. This is a basic rule that must be applied in each local jurisdiction, taking its legislation into account. An important goal is reduction of work handled by the medical examiner.

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